

# **Turning rock into soil – variations in soil mineral reactivity, surface area, and porosity through the critical zone**

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The breaking down of massive rock into smaller grains and the resultant increase in mineral surface area, is potentially the most critical step in soil formation. The aim of this study is to investigate how mineral surface area and porosity varies during pedogenesis, and how these variations in conjunction with mineralogical changes influence soil mineral reactivity.

Soil profiles directly overlying granitic bedrock were systematically sampled from sites in Dartmoor and the Cairngorms. The contrast in glacial histories of Eastern Scotland and South-West England should provide profiles of varying age, and thus soils at different stages of pedogenesis. The differing evolutionary histories of the profiles will be quantified through the dating of individual soil horizons using a combination of carbon-14 and uranium-series techniques. Surface area, porosity, mineralogy, and chemistry of mono- and multi-mineralic samples derived from bulk and individual particle size fractions will be determined using multipoint nitrogen adsorption (B.E.T isotherm), X-ray Diffraction, and X-ray Fluorescence respectively. The dissolution rates of bulk samples and isolated individual mineral species will be determined under far from equilibrium conditions using batch and mixed flow-through reactors. The results yield a systematic understanding of how granitic rock reactivity, mineralogy and surface area vary with age during soil formation.